

of the Chinalco deal.

As negotiations over next year's price begin, China faces a bigger threat: the end of the benchmark system altogether. BHP has long wanted to replace the 'annual changes in price with quarterly ones, based on the spot market. Rio has recently come round to BHP's view, doubtless because it agrees that prices will rise steadily in the coming years and a quarterly system will allow it to increase prices more often. China, meanwhile, will find itself with even less sway over the price than when it began its campaign. ■

### The rise of thin-film solar power

## Leaner and cheaper

WASHINGTON, DC

**The future of solar power is not only bright but also thin**

THE modernist box that won this year's Solar Decathlon, a contest for solar-powered houses sponsored by America's Department of Energy, had solar panels of the conventional, crystalline sort on its roof. But the walls were covered in solar cells made with thin coatings of silicon and other materials in the place of expensive slices of crystal. Thin film, as this technology is known, is still less popular than crystalline cells and its move to the mainstream has been a year or two away for a decade. But its time may have come at last.

There are many exotic ideas involving thin film, from the solar shingles recently unveiled by Dow, a big chemical company, (a roof's worth costs \$27,000) to experimental prototypes of power-generating clothes, roads and cars. But most thin film comes in the form of panels that resemble crystalline ones. They are roughly half as efficient (meaning that a panel must be

twice as big to generate the same amount of power), but a third cheaper, watt for watt. So in places where there is no shortage of space, they are the natural option.

Thin-film cells are also more versatile, since they can be mounted on a variety of materials including flexible plastics and fabrics. Like all solar cells, they are becoming more efficient: the decathletes of Team Germany, who designed the winning house, bragged that its north façade was covered in panels that could convert even indirect sunlight into electricity.

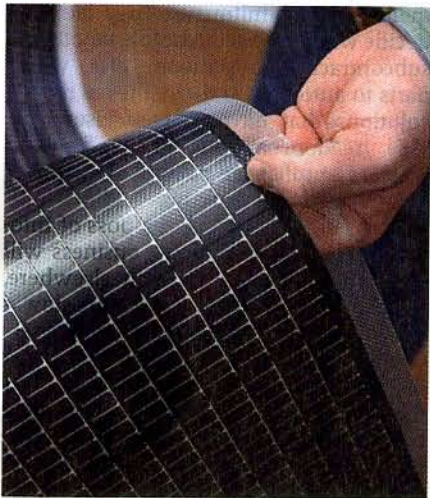
Over the past year or so, thanks to a crash in demand tied to the recession and falling subsidies in big markets, the price of crystalline panels has fallen by 30-40%, undermining thin film's relative advantage. Nonetheless, thin film's share of the market has continued to rise: it is now almost half, compared with just 10% in 2004.

The biggest force in the industry is a firm called First Solar, based in Arizona, a sunny American state. Like that of virtually all alternative-energy firms, its share price has suffered in the recession. But it has nonetheless performed considerably better than Standard & Poor's clean-energy index over the past three years. Its gross margins in the first half of the year were over 50%, on sales of \$944m. This month the firm was added to the S&P 500 stock-market index of America's biggest firms.

First Solar looks likely to continue to grow. Last month it signed a memorandum of understanding with China to install two gigawatts' worth of panels in Inner Mongolia—a place with plenty of space. That is enough to power 3m homes. Installation is due to begin next year and finish in 2019. That and other projects should consume all its output for several years to come.

First Solar's rivals are much smaller. But technological advances may yet catapult one to the fore, says Steve Milunovich, an analyst at Bank of America Merrill Lynch. First Solar makes its cells from a chemical called cadmium telluride. But firms such as Nanosolar, which is building factories in California and Germany, believe that a combination of copper, indium, gallium and selenium known as CIGS will prove cheaper to produce on a mass scale. Researchers at the University of California, meanwhile, hold out great hopes for cells made of organic chemicals.

For the moment, however, the cheapest form of solar power is none of these, but the less glamorous solar-thermal power, which involves heating water with sunlight to make steam. Utilities are also keen to use lenses to increase the amount of sunlight hitting solar panels—a technique known as concentrating solar power. They still need subsidies or a high price on carbon emissions to make investments in any sort of solar power profitable. But the gap between solar and conventional power sources is becoming, well, thinner. ■



A bend in the mode